1. If X and Y are two different physical quantities with different dimensions, which of the following operations is permissible

[1 Marks]

a. $X + Y$

b. $X - Y$

c. $\frac{X}{Y}$

d. $e^{\frac{X}{Y}}$

2. In a simple harmonic motion, the magnitude of acceleration is maximum when

[1 Marks]

a. Displacement is zero

b. Displacement is maximum

c. Speed is maximum

d. Force is zero

3. What happens when water at 4℃ is heated further

[1 Marks]

a. Mass increases slightly

b. Mass decreases slightly

c. Volume increases slightly

d. Volume decreases slightly

4. When a body is heated, then maximum rise will be in its

[1 Marks]

a. Length

b. Surface area

c. Volume

d. Density

5. The amplitude of wave is represented by $= \frac{c}{a+b-c}$. Resonance will occur when

[1 Marks]

a. $b = -\frac{c}{2}$

b. $b = 0 \ \& \ a = c$

c. $b = -\frac{a}{2}$

d. $a = c$

6. No fringes are seen in a single slit diffraction if

[1 Marks]

a. The screen is far away

b. The wavelength is less than slit width

c. The wavelength is greater than slit width

d. The wavelength is less than the distance to the screen

7. When the length of microscope tube is increased, its magnifying power

[1 Marks]

a. Decreases

b. Increases

c. Do not change

d. None of above

8. During an adiabatic process, the pressure of a gas is found to be proportional to the cube of its absolute temperature. The γ of gas is

[1 Marks]

a. 1.3

b. 2

c. 1.7

d. 1.5

9. The quantity $\frac{1}{2}\varepsilon_0 E^2$ has a significance of:

[1 Marks]

a. Energy/farad

b. Energy/coulomb

c. Energy/volume

d. Energy/volt

10. An isolated conducting sphere is given a positive charge. It's mass

[1 Marks]

a. Get decreased

b. Get decreased

c. Remains the same

d. Mass is not involved during the electrification

11. The material suitable for making electromagnet should have

[1 Marks]

a. High retentivity and high coercivity

b. Low retentivity and low coercivity

c. High retentivity and low coercivity

d. Low retentivity and high coercivity

12. The particle which is not be deflected by a magnetic field is
[1 Marks]

a. Proton

b. Neutron

c. Electron

d. Sodium ion

13. In photoelectric effect, if the intensity of light is doubled then maximum kinetic energy of photoelectrons will become
[1 Marks]

a. Double

b. Half

c. Four times

d. No change

14. The rest mass energy of an electron is
[1 Marks]

a. 0.51MeV

b. 5.1MeV

c. 931.5MeV

d. 0.9315MeV

15. Which of the following is not true about nanomaterials
[1 Marks]

a. Opaque material becomes transparent

b. Melting point of nanomaterial is greater than melting point of bulk material

c. They are chemically very active

d. Insulators become conductor

16. Which of the following is not true about nanomaterials

[1 Marks]

a. Opaque material become transparent

b. Melting point of nanomaterial is greater than melting point of bulk material

c. They are chemically very active

d. Insulators become conductor

17. For any vectors $A^{\rightarrow}\&B^{\rightarrow}$, if $A^{\rightarrow}.B^{\rightarrow} = A^{\rightarrow} \times B^{\rightarrow}$, the magnitude of $A^{\rightarrow} + B^{\rightarrow}$ is

[2 Marks]

a. $\sqrt{A^2 + B^2 + \sqrt{2}AB}$

b. $\sqrt{A^2 + B^2 + AB}$

c. $\sqrt{A^2 + B^2 + 2AB}$

d. $\sqrt{A^2 + B^2 - \sqrt{2}AB}$

18. The amplitude of the vibrating particle due to the superposition of two simple harmonic motion $y_1 = \sin\omega t + \frac{\pi}{3} and\ y_2 = \sin\omega t$ is

[2 Marks]

a. 1

b. $\sqrt{2}$

c. 2

d. $\sqrt{3}$

19. The work done in breaking a bigger size spherical oil drop into n smaller size identical droplets is proportional to

[2 Marks]

a. $\sqrt[3]{n^2}$

b. $\sqrt[3]{n^2} - 1$

c. $\sqrt[3]{n - 1}$

d. $\sqrt[3]{n} - 1$

20. The ratio of densities of two bodies is 3:4 and specific heat in the ratio 4:3. The ratio of their thermal capacities per unit volume is

[2 Marks]

a. 9:16

b. 16:9

c. 1:1

d. 3:2

21. The frequency of tuning fork is 384Hz and the velocity of sound in air is 352m/s. The distance traversed by the sound wave while the fork completes 36 vibrations is

[2 Marks]

a. 33m

b. 36m

c. 352m

d. 72m

22. Two waves of same frequency have amplitude 3 units and 4 units. They interfere at a point where their phase difference is 60^0. The resultant amplitude is

[2 Marks]

a. 4 units

b. 5units

c. $\sqrt{37}$ units

d. $\sqrt{47}$ units

23. If the value of First Cauchy constant is 1.501 and refractive index of prism is 1.514, the value of second Cauchy constant if wavelength of light used is 6563$A°$ is

[2 Marks]

a. 5.59×10^{-15}

b. 4.89×10^{-15}

c. 3.79×10^{-15}

d. 9.19×10^{-15}

24. A charge moving in uniform electric field experience a force of 2000N. The potential difference between two points situated at a distance of 1cm is

[2 Marks]

a. 10V

b. 4000V

c. 1000V

d. 40V

25. A 5°C rise in temperature is observed in a conductor by passing a current. When the current is doubled , the approximate rise in temperature is

[2 Marks]

a. 10°C

b. 15°C

c. 20°C

d. 25°C

26. In an AC circuit, we have $V = 100\sin(100t)$ volt and $I = 100\sin 100t + \frac{\pi}{3}$ mA. The power dissipated in the circuit is

[2 Marks]

a. 10kW

b. 10W

c. 2.5W

d. 5W

27. The intensity of x-rays is decreases to 1/120th of its initial value after penetrating the thickness of 2cm material. The absorption coefficient of the material is

[2 Marks]

a. 229.2 m^{-1}

b. 239.4 m^{-1}

c. 249.2 m^{-1}

d. 259.4 m^{-1}

28. If 10% of radioactive substance decays in 5 days, the % of original substance left after 20 days is
[2 Marks]

a. 80%

b. 75%

c. 65%

d. 35%

29. Which of the following is an antecedent?
[1 Marks]

a. All

b. The

c. Always

d. At

30. She _____very beautiful on the stage.
[1 Marks]

a. looks

b. Will be looking

c. looked

d. Was looking

31. Thankfully, we won't be ..... the mess after this concert is over.
[1 Marks]

a. Cleans up

b. Clean up

c. Cleaning up

d. Cleaned up

32. You would _____gotten wet _____it had rained.
[1 Marks]

a. Has- when

b. Have- if

c. Be- when

d. Have- when

33. The passive voice for "I was writing an essay" is:
[1 Marks]

a. An essay was being written by me.

b. An essay was written by me.

c. An essay is being written by me.

d. None of these

34. Choose the sentence that conveys the same meaning as the given sentence.'After the party started, Mary had been relatively quiet in her speech.'
[1 Marks]

a. Mary had not spoken much after the party began.

b. In the beginning, Mary did not speak much.

c. Mary said many words at the end of the party.

d. The party began and Mary tried not to speak much.

35. The doctor and the nurse _____together.
[1 Marks]

a. working

b. work

c. is working

d. works

36. I am worried _____the exam.
[1 Marks]

a. in

b. about

c. on

d. of

37. Choose the correct statement:
[1 Marks]

a. My aunt who lives in Mumbai is a doctor.

b. My aunt, who lives in Mumbai, is a doctor.

c. My aunt, who lives in Mumbai is a doctor.

d. My aunt who lives in Mumbai, is a doctor.

38. What is the antonym for Foreign?
[1 Marks]

a. Local

b. Modern

c. Popular

d. Native

39. How many Plosive sounds are there in English?
[1 Marks]

a. 9

b. 6

c. 2

d. 3

40. The word.....has its primary stress on the second syllable.
[1 Marks]

a. difference

b. defiance

c. defecate

d. destitute

41. Which of these has more no. of molecules?
[1 Marks]

a. 6.4 gm of oxygen

b. 2.2 litre of CO_2 at NTP

c. 4 gm of hydrogen

d. 1 litre of water

42. Octet rule is violated in.
[1 Marks]

a. IF7

b. SF6

c. BeCl2

d. All

43. The hydrogen ion concentration of a solution of pH 3.7 is:
[1 Marks]

a. 10^{-4} M

b. 2×10^{-4} M

c. 3×10^{-4} M

d. 7×10^{-3} M

44. Which of these have smallest size?
[1 Marks]

a. Na^{+}

b. Mg^{++}

c. F

d. O^{--}

45. Which of these has least bpt.?
[1 Marks]

a. NH_3

b. PH_3

c. AsH_3

d. SbH_3

46. Which of these can reduce both conc. H_2SO_4 and $FeCl_3$ solution?
[1 Marks]

a. HF

b. HCl

c. HBr

d. HI

47. A deep brown gas is formed by mixing two colourless gases which are
[1 Marks]

a. NO_2 and O_2

b. N_2O and NO

c. NO and O_2

d. NH_3 and HCl

48. Which of these is ore of gold?
[1 Marks]

a. Cassetterite

b. Azurite

c. Pitch blend

d. Calverite

49. The IUPAC name of malonic acid is
[1 Marks]

a. propanoic acid

b. ethanedioic acid

c. propane-1, 3-dioic acid

d. butane-1,4-dioic acid

50. Total number of isomers given by butane is:
[1 Marks]

a. 2

b. 4

c. 5

d. 6

51. Pure methane can be produced by
[1 Marks]

a. Wurtz reaction

b. Kolbe's electrolytic method

c. Soda-lime decarboxylation

d. Reduction with H_2

52. Metal oxide having formula M_2O_3 is reduced by H_2 gives free metal and water. If 0.232gm of the metallic oxide required 12mg of hydrogen for its reduction, the atomic weight of metal is

[2 Marks]

a. 63.5

b. 56

c. 27

d. 24

53. The volume of Cl_2 gas obtained at STP during electrolysis of NaCl by passing 0.5A current for 30 minutes. Assume current efficiency to be 80%,

[2 Marks]

a. 54.42 ml

b. 68.14 ml

c. 74.12 ml

d. 83.56 ml

54. 1 gm of mixture of NaOH & Na_2CO_3 get completely dissolved in 50 ml of 0.03 N H_2SO_4 solution the % of NaOH & Na_2CO_3 are

[2 Marks]

a. 29% & 71%

b. 21% & 79%

c. 50% & 50%

d. 40% & 60%

55. K_{SP} of $BaSO_4$ is 1.5×10^{-9}. Its solubility in 0.1 M $BaCl_2$ is

[2 Marks]

a. 1.5×10^{-8} mol lit^{-1}

b. 2×10^{-2}

c. 3.87×10^{-4} mol lit^{-1}

d. 4.2×10^{-6} mol

56. The brown ring test for NO^{2-} and NO^{3-} is due to the formation of a complex ion with formation of:

[2 Marks]

a. $[Fe (H_2O)_6]^{++}$

b. $[Fe (NO) C (N)_5]^{++}$

c. $[Fe (H_2O)_5 NO]^{++}$

d. $[Fe (H_2O) (NO)_5]^{++}$

57. The tough cake copper is the copper obtained after purification of blister copper by

[2 Marks]

a. electrorefining

b. poling

c. liquation

d. distillation

58. An alkene is obtained by heating an alcohol with conc. H_2SO_4. The alkene on ozonolysis results aldehyde as main product. The alcohol is :

[2 Marks]

a. ethanol

b. 2-butanol

c. 1-butanol

d. 2-propanol

59. The largest coefficient in the expansion of $(1 + x)^{10}$ is:

[1 Marks]

a. $10! / (5!)^2$

b. $10! / 5!$

c. $10! / (5!\times4!)^2$

d. $10! / (5!\times4!)$

60. Roots of the equation $x^2 + 7x + 12 = 0$ are

[1 Marks]

a. $\{3, -4\}$

b. $\{-3, 4\}$

c. $\{3, 4\}$

d. $\{-3, -4\}$

61. The inverse of the matrix exist only if the matrix is

[1 Marks]

a. rectangular matrix

b. square matrix

c. row matrix

d. column matrix

62. $\frac{8!}{7!} =$

[1 Marks]

a. 56

b. 7

c. 8

d. $\frac{8}{7}$

63. Find the geometric mean between $-2i$ and $8i$

[1 Marks]

a. $\pm 4i$

b. ± 4

c. ± 8

d. none of these

64. The area of the figure bounded by the curve $y = \log_e x$, the x - axis and the straight line $x = e$ is
[1 Marks]

a. 1(

b. 5- e(

c. $3 + e$(

d. none of these

65. The area of the region bounded by the circle $x^2 + y^2 = 1$ is
[1 Marks]

a. 2π sq. units

b. 3π sq. units

c. 4π sq. units

d. π sq. units

66. Find the maximum profit that a company can make, if the profit function is given by $P(x) = 41 + 24x - 18x^2$
[1 Marks]

a. 56

b. 49

c. 23

d. 89

67. $\frac{d}{dx}(ax+b)^n = na(ax+b)^{n-1}$ is valid only when n must be:
[1 Marks]

a. real number

b. rational number

c. Imaginary number

d. Irrational number

68. $\lim_{x \to \pi} \frac{\sin(\pi - x)}{\pi - x}$ is

[1 Marks]

a. 1

b. 0

c. ∞

d. nonexistent

69. The Centre and the radius of the circle is $x^2+y^2-4x-4y-8 = 0$ are

[1 Marks]

a. (2, 2), 4

b. (1, 2), 3

c. (-1, 3), 6

d. (2, 2), 8

70. The equation of ellipse is $\frac{x^2}{25} + \frac{y^2}{9} = 1$. Then the length of the major axis, the minor axis and the eccentricity are

[1 Marks]

a. 8,6,5/3

b. 10,6,4/5

c. 6,4,3

d. 10,4,3/5

71. The lines joining the points of intersection of the line $x + y = 1$ and the curve $x^2+y^2-2y+\lambda = 0$ to the origin are perpendicular. Then, the value of λ =

[1 Marks]

a. 1/2

b.-1/2

c. $1/\sqrt{2}$

d. 0

72. The co-ordinate of the points which divide the line segment joining the points (-2,6) and (-6,18) in the ratio 1:3 externally are

[1 Marks]

a. (2,-6)

b. (6,-18)

c. (1,-3)

d. (-4,12)

73. Two planes x=0 and y=0 are:

[1 Marks]

a. parallel

b. intersect on Z-axis

c. at right angle

d. both b and c

74. If $f(x) = x$ and $g(x) = x^2$ then the value of $(fog)(x)$ is

[1 Marks]

a. x^2

b. x

c. x^3

d. x^4

75. Period of $\mathrm{cosec}x$ is

[1 Marks]

a. $\frac{\pi}{2}$

b. π

c. 2π

d. 4π

76. A problem in mathematics is given to three students A, B, C and their respectively probability of solving the problem is $\frac{1}{2}, \frac{1}{3}$ and $\frac{1}{4}$. The probability that the problem will be solved is

[1 Marks]

a. $\frac{3}{4}$

b. $\frac{1}{2}$

c. $\frac{2}{3}$

d. $\frac{1}{3}$

77. The vectors$\vec{a} = \vec{i} + 2\vec{j} + 3\vec{k}$ and $\vec{b} = 2\vec{i} + 4\vec{j} + 6\vec{k}$ are

[1 Marks]

a. perpendicular

b. parallel

c. not parallel

d. none of these

78. Lowest value of variance can be

[1 Marks]

a. 1

b.-1

c. 3

d. 0

79. If $x^3 + ax^2 - a^2x - a^3$ is divided by $x + a$, then the remainder is

[2 Marks]

a. 0

b. a^3

c. $2a^3$

d. $-2a^3$

80. If A= $\begin{bmatrix} 0 & 1 & 3 \\ 0 & 2 & 4 \\ 0 & 3 & 5 \end{bmatrix}$ then $|A| =$

[2 Marks]

a. 0

b. 1

c. 10

d.-1

81. If $n_{C_8} = n_{C_{12}}$ then $n =$

[2 Marks]

a. 20

b. 4

c. 8

d. 12

82. If $a_n = \frac{1}{2^n}$, then first four terms are

[2 Marks]

a. $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}$

b. $2,4,8,16$

c. $1,2,4,8$

d. $1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}$

83. $\int_0^{\frac{\pi}{2}} \log \frac{4+3\sin x}{4+3\cos x}\, dx$ is

[2 Marks]

a. 2

b. ¾

c. 0

d.-2

84. The function $f(x) = ax^2 + bx + c$ has minimum value if:

[2 Marks]

a. $a > 0$

b. $a < 0$

c. $a = 0$

d. $a = -1$

85. If $y = \sinh^{-1}(ax + b)$, then $\frac{dy}{dx} =$

[2 Marks]

a. $\cos^{-1}(ax + b)$

b. $\frac{1}{\sqrt{1 + (ax + b)^2}}$

c. $\frac{a}{\sqrt{1 + (ax + b)^2}}$

d. $a\cosh^{-1}(ax + b)$

86. $\lim_{x \to \infty} \frac{3x^2 + 27}{x^3 - 27}$ is

[2 Marks]

a. ∞

b. 1

c.-1

d. 0

87. If the straight line y=mx is outside the circle $x^2+y^2-20y+90=0$, then

[2 Marks]

a. $m < 3$

b. $m < 3$

c. $m > 3$

d. $m > 3$

88. The vertex of the parabola $x^2+8x+12y+4=0$ is

[2 Marks]

a. (-4,1)

b. (4,-1)

c. (-4,-1)

d. (4, 1)

89. The general equation of second degree in x and y, $ax^2+2hxy+by^2+2gx+2fy+c=0$ represents a pair of straight line if

[2 Marks]

a. $af^2+2fgh + 2g +2f +c =0$

b. $\begin{matrix} a & g & f \\ g & b & h \\ f & h & c \end{matrix}$

c. $abc+ 2fgh+-af^2-bg^2-ch^2=0$

d. $af^2+bg^2+ch^2-2fgh+abc=0$

90. The length of the projection of the segment joining P(-1,2,0) and Q(1,-1,2) on the planes 2x-y-2z = 4 is

[2 Marks]

a. $2\sqrt{2}$

b. 4

c. $2\sqrt{3}$

d. 3/2

91. If $A = \{x : x^2 = 1\}$ and $B\ \{x : x^4 = 1\}$, then $A \triangle B$isequal to:

[2 Marks]

a. $\{i, -i\}$

b. $\{-1, 1\}$

c. $\{-1, 1, i, -i\}$

d. None of these

92. Period of $\cot\frac{x}{2}$ is

[2 Marks]

a. π

b. $\frac{\pi}{2}$

c. $\frac{\pi}{4}$

d. 2π

93. The projection of $\vec{a}$ in the direction of $\vec{b}$ is

[2 Marks]

a. $\mathrm{bcos}\theta$

b. $\mathrm{abcos}\theta$

c. ab

d. $\mathrm{acos}\theta$

94. The rotten animal flesh smell is due to

[2 Marks]

a. nitro compounds

b. phenolic compounds

c. amino compounds

d. aldehyde compounds

95. What is the chemical formula for Prussian blue?

[2 Marks]

a. $Fe_4[Fe(CN)_6]_3$

b. $Fe[Fe(CN)_6]$

c. $Fe_3[Fe(CN)_6]_2$

d. $K_2Fe[Fe(CN)_6]$

96. Diazotisation reaction gives:

[1 Marks]

a. aniline

b. azo dye

c. benzene diazonium salt

d. chlorobenzene

97.

Read the following passage and answer the four question that follow:

A comet is a small, icy and dusty celestial body that orbits the Sun. It consists of a nucleus, which is the solid center of the comet, and a coma, which is the cloud of gas and dust surrounding the nucleus. When a comet passes close to the Sun, the Sun's heat expands the coma and creates a bright, glowing halo called a coma. Comets are often called "dirty snowballs" because they are composed of water, methane, and other volatiles. They are believed to be remnants of the early solar system and may provide insight into the formation and evolution of planets.

Q. What is a comet?

[2 Marks]

a. A small, icy and dusty celestial body that orbits the Sun

b. A large, rocky and dusty celestial body that orbits the Sun

c. A small, icy and rocky celestial body that orbits the Sun

d. A large, rocky and gaseous celestial body that orbits the Sun

98. What does a comet consist of?

[2 Marks]

a. A nucleus and a coma

b. A nucleus and a halo

c. A coma and a halo

d. A nucleus and a tail

99. What is the coma?

[2 Marks]

a. The solid center of the comet

b. The cloud of gas and dust surrounding the nucleus

c. The bright, glowing halo around the comet

d. The tail of the comet

100. What causes the bright, glowing halo around the comet?

[2 Marks]

a. The Sun's heat expanding the coma

b. The Sun's light reflecting off the coma

c. The collision of the comet with another celestial body

d. The eruption of the comet's nucleus

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